HAND-HELD PORTABLE COMPUTER HAVING AN ELECTROLUMINESCENT FLAT-PANEL DISPLAY WITH PIXEL ELEMENTS AT RIGHT ANGLES TO THE PLANE OF THE DISPLAY AND AN EXCITATION DIRECTION PARALLEL TO THE PLANE OF THE DISPLAY

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of copending application Ser. No. 08/144,231 filed Oct. 28, 1993, a continuation-in-part of copending application Ser. No. 08/159,078 filed Nov. 29, 1993, which is a continuation-in-part of 08/097,946 filed Jul. 26, 1993, now U.S. Pat. No. 5,278,730, which is a continuation of application Ser. No. 07/905,480, filed Jun. 29, 1992, abandoned; and comprises in addition the description and drawings of U.S. Pat. No. 5,239,227, published Aug. 24, 1993.

FIELD OF THE INVENTION

This invention is in the area of portable computers and pertains more specifically to small portable computing devices known in the art as personal digital assistants,

BACKGROUND OF THE INVENTION

Personal Digital Assistant (PDA) units, as of the date of this disclosure, enjoy a position of hope in the computer marketplace. Some believe this approach, a small, relatively inexpensive, and eminently portable computer unit, having software specifically written for tasks a user might expect to perform while travelling, will provide eminently useful and therefore salable computer products. Apple Computer, Hewlett Packard, and several other well-known computer manufacturers have made a considerable investment at no small risk in such systems.

Given the new systems now introduced, and those coming, for what is now known about them, there are still a number of drawbacks and problems. For example:

1. The PDA systems introduced are relatively costly, with starting prices ranging from several hundred dollars to two thousand dollars and more. At such prices, rivalling current pricing for desktop systems, the buying public may react negatively. It is true that prices will fall with increased manufacturing volume and competition, but the high end start may well be rejected by potential users.

2. The systems being offered are still relatively bulky, considering the limited range of tasks that may be accomplished. Most are certainly too big to be conveniently carried in a breast pocket. The Newton, manufactured by Apple Corporation, weighs about a pound and is approximately the size of a VHS video cassette.

3. A big drawback of the PDA systems being offered is the way they transfer data between a user's desktop unit, or other host, and the PDA. Known communication is by modem, by infrared communication, and by serial connection. These all require manipulation by a user, modulation on one or both ends of the communication path, and the like, which can be time-consuming, error-prone, and hardware extensive (expensive). Presently the Newton offers a modem and/or LED communication as an option, adding to the overall cost.

4. In known PDAs, software is typically recorded in ROM, so updating applications can be difficult, and sometimes impossible. This will be a problem because PDA users will not want the PDA to have the same capabilities at all times. Typical users will be people who travel and work while they travel. These users require different functions for a trip to Taiwan than for a trip to France, for example. What is needed is a quick and convenient means to update and substitute software.

5. Another difficulty is in the fact that the data files a user manipulates while travelling are typically data files also resident in a home unit, herein called a host unit, such as the user's office desktop machine or notebook or other portable computer. It is very troublesome to have two or more sets of critical data, with differences that one must remember to correct at an appropriate time. This can cause unending grief if files are not correctly updated. At best, current PDAs must use a relatively slow compressed bus to download and upgrade files. Typically this is done through a serial port, using a linking application like Laplin™.

What is needed is a small and inexpensive PDA that has a range of features that eliminate the above-described risks and problems. This new unit needs to be smaller than those presently being introduced, such as about credit-card size, or perhaps modeled on the PCMCIA type II or type III standard form factors. It should be inexpensive enough to produce that at least a minimum version could be sold in the roughly $100–$200 range, so it will be a unit seen to be a relatively inexpensive necessity. A PDA unit of this sort is the subject of the present invention, and is termed by the inventors a micro-PDA, or μPDA.

A very important feature of the μPDA in an aspect of the present invention is a direct parallel bus interface with a connector allowing the unit to be docked by plugging it into a docking bay in a host unit. Moreover, when the μPDA is docked in the host, there needs to be a means to effectively disable the CPU in the μPDA and to provide direct access to both the μPDA software and data storage by the host CPU. This direct access would provide immediate ability to communicate in the fastest available fashion between the μPDA and the host, and would also facilitate additional important features to be described below.

The μPDA also needs to have an optional compressed bus interface, including a connector separate from the host interface, so add-on devices may be utilized, such as a FAX modem, cellular communication, printer, and so on.

An additional feature that could be optionally provided in another aspect of the invention is an interface at the host to allow a user to select pre-arranged software mixes for loading to the μPDA. This feature comprises a set of control routines operating in conjunction with the host's display and input means, to allow the user to quickly select applications and perhaps data as well to be loaded to the μPDA satellite, to configure the smaller, more portable unit for specific itineraries and purposes.

Another desirable feature is an ability to automatically update data files. In this aspect of the invention, with the μPDA docked, data on the host, if carrying a later date and/or time stamp than the data on the μPDA, would be automatically updated on the μPDA and vice-versa. When one returns from an excursion using the μPDA and docks the satellite at the host, the host gains access, determines the location of the latest files, and accomplishes the update. This feature needs to have some built-in user prompting to be most effective. It makes the μPDA a true satellite system.

SUMMARY OF THE INVENTION

In a preferred embodiment of the invention a personal digital assistant module is provided comprising an enclosure